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Original Research

The Influence of BMI Levels on the Values of Static and Dynamic Balance for Students (Men) of the Faculty of Physical Education and Sports

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Abstract

Background: Postural stability is a factor that conditions the motor performance of athletes and of different categories of the population involved in activities that require physical effort. The aim of the study is to highlight the differences that appear in terms of balance performance for students, depending on their classification on BMI levels. **Methods**: A group of 109 students from the Faculty of Physical Education and Sports (1st year undergraduate) participated in this study at the end of the academic year (May, 2019), being divided following the anthropometric assessment into 3 groups related to BMI levels (7 cases of underweight, BMI = 17.21 $\pm$ 1.11; 83 cases of normal weight, BMI = 22.29 $\pm$ 1.56; 19 cases of overweight, BMI = 27.97 $\pm$ 2.89). The research is cross-sectional, using the MANOVA statistical calculation procedure (multivariate and univariate test—with Bonferroni Post Hoc Test and comparison of significance between the mean values of the 3 defined groups, for the 7 applied balance tests). **Results**: Univariate test results indicate values of F associated with statistically insignificant thresholds ($p > 0.05$) for most of the tests used, with weak and very weak values of size effect (η^2_p). This aspect is also reinforced by the differences between the averages of the analyzed pairs, where only the statistically significant superiority ($p < 0.05$) of the underweight over the overweight for the Stork test is noticed. The underweight group achieves slightly superior performance in the assessments for Standing balance test, Stork test, Flamingo test, Walk and turn field sobriety test, and that of the normal weight for Functional reach test and Bass test, the overweight having the poorest results in most tests; the differences between the 3 BMI levels analyzed are insignificant ($p > 0.05$). **Conclusions**: Even if underweight and normal weight have better average scores than overweight, the lack of statistical significance of these differences can be explained by student specialization, constant involvement in physical performance, curricular or leisure activities improving performance on balance tests for the overweight category. These results reflect the particularities of the studied group and cannot be generalized for the university population, especially due to the numerically reduced group of underweight people.

Keywords: students; balance tests; BMI levels; postural stability

1. Introduction

Maintaining balance is conditioned by the quality of the sensory systems (vestibular, visual and proprioceptive). Proprioceptive information located at the ankle is defining in postural stability, reducing the chances of injury to the legs and achieving high athletic performance [1]. The manifestation of obesity is often associated with problems of body stability, major risks of falls and increased incidence of fractures, poor resistance to physical stress. Balance workouts are recommended for these risk groups, combined with measures to reduce body weight and increase relative strength, as options for improving postural deviations, for this category there is also a visible limitation of the (range of motion) ROM [2]. Poor development of the muscular system, along with a high percentage of adipose tissue will cause problems in obese people related to maintaining orthostatic position, impaired walking quality, poor neuromuscular feedback, with a marked shift of the CoP in the antero-posterior direction/AP. Postural instability will be higher, as well as the risk of falling and trauma, compared to underweight and normal weight [3].

There is a high chance (for children) of the manifestation of balance problems, simultaneously with the increase of BMI indicators. The association between low fitness and high BMI values in young Africans (Ghana and South

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Africa) has recently been demonstrated, so high BMI levels are a factor that predicts a limitation of motor skills [4]. For children aged 12–15, overweight and obese, there is a decrease in balance ability in the anterior reach direction, compared to normal weight, being reported differences in the strength of the flexor and extensor muscles of the lower limbs [5]. Static and dynamic physical activities performed on various surfaces (stable and unstable) are recommended, with the need to individualize them and perform them with your eyes open and closed. For obese children, they have a beneficial role on postural balance, strengthening the muscles of the lower limbs, improving the mobility and the stability of the ankles, stimulating proprioceptive mechanisms [6]. For young adults with obesity, there are reports of problems with spinal deficiencies. They need more time to solve different motor tasks, poorer results in dynamic balance assessment tests and a more pronounced mid-lateral displacement of the CoP. Despite these problems, no significant differences were found compared to the performance of normal weight, in the tests to assess the unipodal and bipodal static balance [7]. For the elderly, negative correlations are identified between the results of balance tests and their BMI levels, but physically active overweight subjects still have better balance performance, so physical exertion and thus improving muscle strength improve postural stability [8]. Obesity, when combined with sensory problems will lead to increased body balance in orthostatism, with research conducted on strength platforms that demonstrate the significant superiority of normal-weight elderly in maintaining balance with eyes closed and open, compared to overweight, who have major risks of imbalance and fall [9]. Groups of the elderly where musculoskeletal disorders (MSDs) are reported, especially in the back and knee areas, are characterized by a decrease in performance for dynamic balance, compared to groups where these problems are not identified [10]. Aging is accompanied by impaired functional fitness values and decreased dynamic balance values. These aspects are verified for the adult/male persons in Seoul/Korea, which have lower and lower scores in the Up and Go test (3 m), the older the age of those evaluated, the late middle-older adults category being the most affected [11].

Other research indicates significant differences between obese and normal weight for CoP variations. For obese women they are manifested only in the antero-posterior plane, and for obese men they are also observed in the mid-lateral plane/ML displacements. It is recommended to apply programs to reduce body weight and to tone the muscle groups that act on the ankle joint [12]. For obese women (BMI >40) there are found reductions in the range of dynamic stability, but also a functional adaptation, materialized in a lower postural balance [13]. A study of 145 adult women showed a decrease in postural stability control for those with excess body mass, but for the young and physically active category, a decrease in postural balance and a lower rate of CoP were observed [14]. Significant differences are found between football playing and sedentary college students in terms of static and dynamic balance performance, but not between genders. These aspects strengthen the beneficial role of physical activity in improving postural stability, as balance problems can lead to limited performance in sports and favor injuries [15].

Concerns for optimizing balance have the effect of performing different types of movements and increasing body stability (although balance is not an element of physical fitness), if they are accompanied by actions aimed at increasing the strength of postural muscles. For the obese, balance training is important because of the higher risks of falling and injury [16]. Only actions aimed predominantly at optimizing the muscular strength of the obese do not solve the balance problems, being also indicated a decrease in body weight, this aspect having favorable effects on the postural control and on the quality of the movements of the upper limbs [17]. The balance of overweight and obese, with a higher amplitude than normal weight is also highlighted by [18]. The authors highlight the role of physical activity in optimizing performance on balance tests, which promote significant weight loss, even if there is a decrease in isometric knee extension.

Neglecting actions aimed at developing balance through specific training has negative effects on the technique of performing specific technical procedures in football. A higher level of balance avoids the occurrence of potential traumas and capitalizes on the sensory-motor skills involved in competitive performance activity [19]. Balance training should be correlated with the level and stage of preparation, with the role of preventing injuries and increasing postural stability, being recommended to plan them at least 3 times/week [20].

The purpose of the study is to investigate how the distribution of students at different BMI levels (underweight, normal weight and overweight/obese) influences the results of these groups in the applied static and dynamic balance tests, for a group of university students in which performance or leisure physical activities and curricular activities are constant concerns. We aimed to identify the differences between the defined groups and compare the results of this study with those provided by other scientific papers.

Working hypotheses: We estimate that the independent variable BMI levels will generate significant differences in performance on applied balance tests (dependent variables).

2. Materials and Methods

2.1 Participants

The investigated group consists of male students enrolled in year 1 (undergraduate studies) of the Faculty of Physical Education and Sports, from the Dunărea de Jos University in Galați, with 2 distinct specializations: Physical and Sports Education, respectively Physical Therapy

Table 1. Identification data of each analyzed group (age, anthropometric indicators and BMI values).

Group type	Parameters analyzed	Minimum	Maximum	Mean	Std. error	Std. deviation
Underweight N = 7	Age	19.00	23.00	20.7143	0.56544	1.49603
	Weight	42.00	68.00	54.2857	3.88963	10.29100
	Height	161.00	192.00	176.7143	4.52356	11.96821
	BMI	15.90	18.40	17.2143	0.42056	1.11270
Normal weight N = 83	Age	18.50	28.00	20.3012	0.19506	1.77712
	Weight	54.00	90.00	71.2530	0.90852	8.27698
	Height	161.00	204.00	178.4940	0.74196	6.75959
	BMI	18.70	25.00	22.2969	0.17186	1.56574
Overweight N = 19	Age	19.00	31.00	21.2632	0.68331	2.97848
	Weight	68.00	109.00	88.7895	2.03562	8.87305
	Height	163.00	189.00	178.2368	1.54578	6.73789
	BMI	25.30	37.50	27.9789	0.66445	2.89628

and Special Motor Skills. The two specializations had the same curriculum during the 2 semesters of year 1, so there are no conditions that have favored or disadvantaged any of the specializations, in terms of planned curricular practical activities and that have an effect on the values of the balance. All participants are physically active, being involvement in performance sports or leisure physical activities, to which are added the compulsory activities associated with the sports disciplines in the curriculum. From the initial group of 114 participants, 5 people were eliminated from the study (who did not take the entire planned battery of tests), leaving a number of 109 participants, who were tested and whose results were subsequently processed. Out of the total number of students, 42 are in the category NA/non athletes, 36 in TSG/team sports games and 31 in IS/individual sports. Table 1 summarizes the division of subjects into groups associated with BMI levels (underweight, normal weight and overweight/obese), with the presentation of the number of cases, respectively the average values and the extreme values related to age, height, weight and BMI. It was preferred to include overweight (BMI >25) and obese (BMI >25) in the same subgroup, due to the small group of students and to facilitate the statistical calculation, by generating a smaller number of pairs to be compared. The tested group received a favorable medical opinion for involvement in physical exertion.

2.2 Procedure

Our study was based on a cross-sectional research, in which the testing of the subjects was scheduled in the middle of the 2nd semester of the 2018–2019 academic year (April). The evaluation process was carried out within the Research Center for Human Performance, associated with the Faculty of Physical Education and Sports in Galați. 7 balance investigation tests were used, of which 3 are specific to static balance (Stork test/sec, one leg standing with eyes closed/sec, Flamingo test/falls) and 4 specific to dynamic balance (Functional reach test/cm, Bass test/points, Walk and turn field sobriety test/errors, Fukuda test/degrees of rotation), details related to the test procedure and quantification of results are stipulated in the sources [21–24]. The test battery application time interval was 12:00–16:00 PM, avoiding testing in the early morning and very late in the evening, so that the variations generated by the circadian rhythm not to negatively influence the results obtained. To ensure the focus of the participants, their testing was performed in small groups (6–8 people). Students were instructed on the purpose of the study, the correct execution technique and the interpretation of the results of each test, receiving the recommendation not to engage in demanding physical exertion before the test, so that physical and nervous fatigue does not adversely affect the value of results. In the warm-up that preceded the assessment and in the breaks between tests, light aerobic efforts and stretching exercises were performed. The research complied with all the deontological requirements associated with investigations involving human subjects, as set out in the Helsinki Declaration [25,26].

2.3 The Statistical Analysis of Data

The data processing was performed through the IBM SPSS Software 24.01 (Statistical Package for the Social Sciences, Chicago, IL, USA). ANOVA (Multivariate and Univariate test) techniques were applied, being determined and used: Levene's Test of Equality of Error Variances, F values and related significance thresholds, size effect expressed by η^2_p (Partial and squared), calculation of differences (in pairs) of the average test performance values for the 3 defined groups (underweight, normal weight and overweight), with the application of Post Hoc Tests (Bonferroni) [27–29]. The confidence interval was set at 95%. The graphs showing the value of the individual performances at the level of the 3 groups (for Stork test and Fukuda test) were made with the help of the Microsoft Excel editor.

3. Results

The data resulting from the statistical processing are summarized in Table 2 (multivariate test values), Table 3 (univariate test values) and Table 4 (significance of differences between the compared data pairs). The individual re-

Table 2. **The results of the Multivariate Tests[a] (MANOVA).**

Effect	λ	F	Hypothesis df	Error df	Sig.	η^2_p	Observed power
BMI levels	0.882	0.927[b]	14.000	200.000	0.531	0.061	0.579

a. Design: BMI levels; b. Exact statistic; λ-Wilk's lambda; F-Fisher test; df-degrees of freedom; vSig., level of probability; η^2_p, partial eta squared.

Table 3. The results of the analysis of univariate tests (ANOVA)/The effect of BMI classes on dependent variables (balance tests).

Nr. Crt.	Dependent variable (Balance tests)	Sum of squares	Mean square	F (2, 106)	Sig.	η^2_p	Observed power
1	Standing balance test	356.566	178.283	0.741	0.479	0.014	0.173
2	Functional reach test	43.180	21.590	0.396	0.674	0.007	0.112
3	Stork test	668.189	334.094	3.170	0.046	0.056	0.596
4	Flamingo test	36.113	18.056	1.518	0.224	0.028	0.317
5	Bass test	142.577	71.288	0.354	0.703	0.007	0.105
6	Walk and turn field sobriety test	0.268	0.134	1.076	0.345	0.020	0.234
7	Fukuda test	339.460	169.730	0.888	0.415	0.016	0.200

Table 4. Average values of the scores obtained by the groups (BMI classes) and the significance of the difference between them (underweight/N = 7, normal weight/N = 83, overweight/N = 19).

Dependent variable	Group	Mean	Std. deviation	Std. error	a-b	Sig.[b]	a-c	Sig.[b]	b-c	Sig.[b]
Standing balance test (sec)	a. underweight	13.4571	19.38908	5.864	0.654	1.000	5.352	1.000	4.698	0.709
	b. normal weight	12.8034	16.50639	1.703						
	c. overweight	8.1053	7.12726	3.559						
Functional reach test (cm)	a. underweight	41.7857	7.91548	2.793	–1.508	1.000	–0.043	1.000	1.465	1.000
	b. normal weight	43.2940	7.66846	0.811						
	c. overweight	41.8289	5.71808	1.695						
Stork test (sec)	a. underweight	13.7571	15.33518	3.880	6.811	0.284	11.129*	0.048	4.318	0.303
	b. normal weight	6.9461	10.86348	1.127						
	c. overweight	2.6279	2.15731	2.355						
Flamingo test (attempts)	a. underweight	4.7143	2.87021	1.304	–0.274	1.000	–1.759	0.754	–1.486	0.280
	b. normal weight	4.9880	3.37673	0.379						
	c. overweight	6.4737	3.92100	0.791						
Bass test (points)	a. underweight	72.1429	13.10761	5.365	–3.869	1.000	–1.857	1.000	2.012	1.000
	b. normal weight	76.0120	14.30205	1.558						
	c. overweight	74.0000	14.04754	3.256						
Walk and turn field sobriety test (errors)	a. underweight	0.0000	0.00000	0.133	–0.108	1.000	–0.211	0.539	–0.102	0.773
	b. normal weight	0.1084	0.31282	0.039						
	c. overweight	0.2105	0.53530	0.081						
Fukuda test (degrees)	a. underweight	9.4286	10.98267	5.226	–4.005	1.000	–7.571	0.655	–3.566	0.938
	b. normal weight	13.4337	12.34187	1.518						
	c. overweight	17.0000	19.79338	3.172						

* The mean difference is significant at the 0.05 level.

[b] Adjustment for multiple comparisons: Bonferroni.

sults of the students from the 3 BMI level groups are plotted for the Stork test and the Fukuda Test in Figs. 1,2.

Multivariate analysis indicates an insignificant global influence of the independent variable BMI levels on the battery of applied tests (dependent variables) for the assessment of balance (F = 0.927, p = 0.531, value >0.05), and the size effect value (expressed by η^2_p) indicates the fact that that only 6.1% of the variance in the tests used is explained by the independent variable.

Univariate test results indicate no significant influence of BMI levels on 6 of the 7 tests used ($p > 0.05$), and size effect values (η^2_p) are very low or zero. The exception is the Stork test, where the value of F = 3.17 is associated with a threshold p = 0.046, statistically significant ($p < 0.05$).

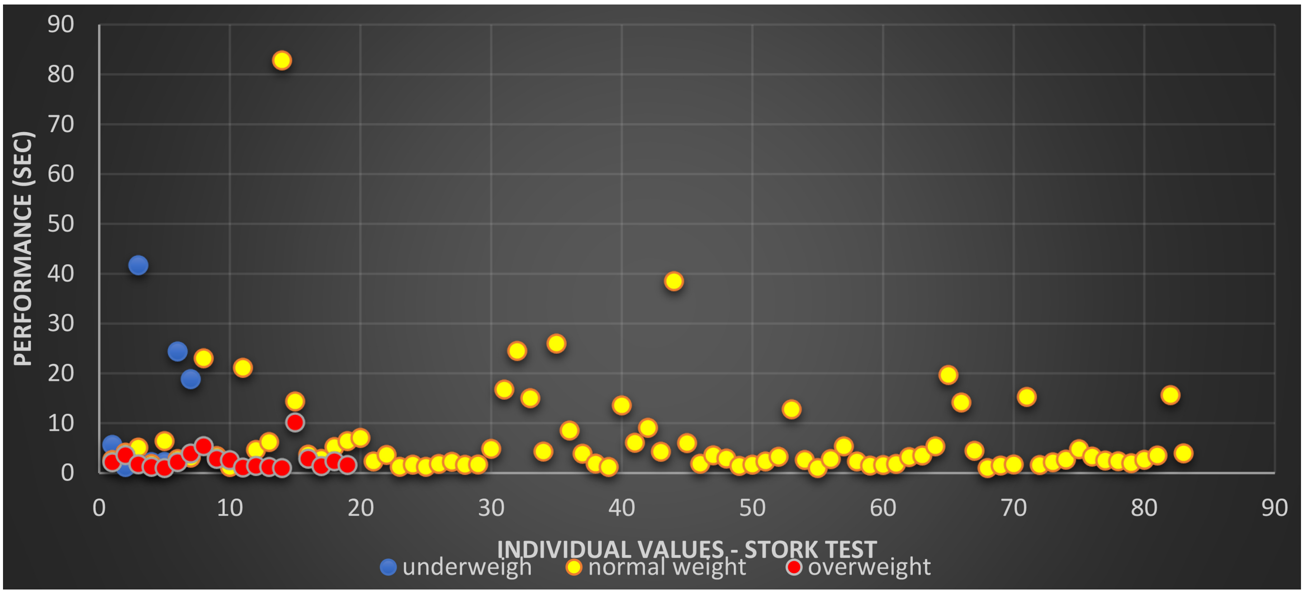

Fig. 1. Individual performance dynamics at the level of the 3 BMI groups for the Stork test.

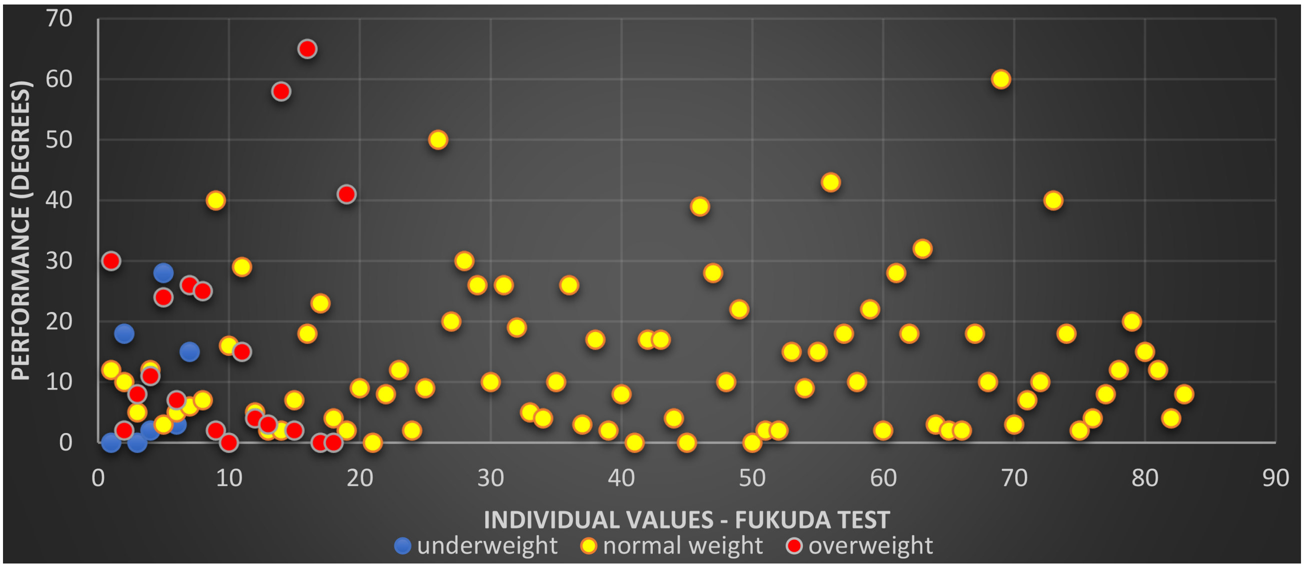

Fig. 2. Dynamics of individual performance at the level of the 3 BMI groups for the Fukuda test.

However, the size effect value is in this case weak to average, only 5.6% of the variance encountered in the results of this test being explained by the independent variable BMI levels.

The analysis of the differences between the average values on the resulting pairs (underweight-normal weight, underweight-overweight, normal weight-overweight) indicates for most cases a superiority of the results of underweight and normal weight students compared to the average scores of overweight, but they are insignificant ($p > 0.05$). Even for the Stork test, the significant difference results only for the underweight-overweight pair ($p = 0.048$), and for the underweight-normal weight and normal weight-overweight pairs statistically insignificant thresholds are reported. It is a surprise the slight superiority of the underweight performances compared to the normal ones for 5 tests: Standing balance test, Stork test, Flamingo test, Walk and turn field sobriety test (where no mistakes are made in performing it) and Fukuda test. However, the low number of underweight in the study group leads us to look with caution at these superior results and not to draw a clear conclusion about the performance of this small group. The normal weight students have the best performance in the Functional reach test and the Bass test, but no significant differences are reported between them and the other 2 subgroups in even one test. It should be noted that in the Fukuda test only 8 students (7.33%) did not show body rotation around the axis at the end of the test, 70 students (64.22%) rotated to the right and only 31 students (28.44%) to the left. Also, in the Fukuda test, the average values of the 3 groups are below

30^0, considered the threshold value that signals vestibular disorders, on the side of the body rotation. For the Flamingo test, we point out that all students passed this test according to the methodology, without even a single case requiring the maximum number of tries allowed (15), to total the 60 seconds of maintaining the position imposed on the support. A surprising aspect is the higher average score (but statistically insignificant) of overweight than normal weight, in the Bass test.

Fig. 1 explains the better average score of the underweight group in the Stork test, by the presence of 3 higher values, which improve the performance of this group. Also, the individual values of the underweight are mostly grouped in the area of lower performances, which decreases the average value of this group, generating a statistically significant difference between these groups.

In Fig. 2 we identify values that show wider rotations around the body axis for the overweight group, by the existence of scores placed above the average of the results and even towards the upper end, while the values of the underweight group are concentrated towards the area indicating scores associated with a lower rotation of the body for the Fukuda test.

4. Discussion

Most specialized sources support the theory that, for the population categories where BMI values are high, the performance of static and dynamic balance is also affected. Our study confirms the weaker values of the overweight/obese group in the applied tests, but without the differences from the normal-weight and overweight groups being statistically significant for most of the tests applied ($p > 0.05$).

Recent research on groups of Chinese children aged 8–10 years strengthens the idea of differences between obese and normal weight for the level of manifestation of dynamic balance, but these differences are not confirmed by gender. For the unipodal static balance with the eyes open, significant differences are obtained between BMI levels and genders, but for the bipodal static one with the eyes closed, no significant differences between genders, respectively between normal and obese are reported [30].

For Brazilian children, difficulties related to postural stability are found in the standing on tiptoes and standing one leg variants, and the results of the balance tests are negatively associated with high BMI values [31]. The situation is similar for young boys (10–21 years old), where overweight people have lower performance values than normal weight when assessing balance through Bruininks-Oseretsky tests, according to [32]. Another investigation finds limited abilities of static and dynamic balance for obese boys at the pre-pubertal age (8–10 years), compared to the values of normal weight [33].

At the level of obese women and men, there are problems related to walking quality, accompanied by low values of the results in the Functional reach test, compared to the normal weight, according to [34]. In our study, the overweight group made the most mistakes in the Walk and turn field sobriety test. At the level of female university students in Iran, there are associations between performance on balance tests and anthropometric indicators, highlighting weak positive correlations between BMI values and dynamic balance, but also weak negative correlations between lower limb length and dynamic balance values [35]. Young adults (x = 21 years old) involved in MVPA (moderate to vigorous physical activity) have a much smaller balance area and therefore better balance scores compared to sedentary people. Men perform poorer than women, and closed-eye testing generates lower performance level compare to open-eyed testing [36]. For similar age groups (x = 21.7 years) underweight and normal weight subjects have better results than the obese group, for static and dynamic balance tests, and in men there is a lower postural balance compared to women [37]. For our group, the superiority of underweight and normal weight for the applied set of tests is confirmed.

For high-performance athletes (x = 21.34 years) with high stature, balance training is indicated, in order to be successful in sports competitions that require dynamic balance. There is a better attainment of postural balance for those with high body weight and implicitly higher BMI values, but accompanied by obvious problems when they become unbalanced and immediately try body rebalancing actions [38]. Subjects involved in performance sports activity (sport dancing and judo) show superior results in balance tests with their eyes open compared to non-athletes, which confirms the beneficial role of planned physical effort in ensuring postural stability. Proprioceptive demands are stronger for judoka, who thus outperform dancers in closed-eye tests [39]. The increased values of dynamic balance for football/soccer players at the U-15 and U-18 level also depend on the physical parameters: flexibility, muscular strength, back muscle strength and core strength, according to [40]. Other researchers find strong and positive correlations between performance on static balance tests assessed by One leg standing balance test and trunk muscle endurance indicators, the study was conducted on Iranian male students (x = 23.9 years) in Tehran [41].

A comparison between groups of female dancers and those who are physically active but not involved in dance showed that dancers get better scores on some balance tests, but the values are balanced for the Bass test [42]. Football training positively influences the balance of young women, who stand out through a better use of vestibular information and an asymmetrical support of body weight, compared to the sedentary category [43]. For Turkish students of the Faculty of Physical Education and Sports, progress is found in the values of strength, flexibility and static balance (assessed by the Flamingo test), following participation in an artistic gymnastics program (12 weeks $\times$ 2 workouts/week $\times$ 1 hour/session), according to [44]. The obligatory involvement of the students in our group in the practical curricular activities is an argument of the lack of significance of the results between the analyzed groups.

Body balance, walking quality and lower limb strength are significantly improved by combining real-time visual feedback with workouts that include sit-to-stand exercises, used 6 weeks × 5 days/week 20 minutes/session [45]. Other authors propose dynamic balance structures, included in training and applied for 5 weeks to groups of overweight women, being found demands of the visual apparatus and muscle components, with visible advances in static balance for most tested subjects [46]. Another study that compares the balance of obese and normal-weight women indicates a higher balance in the anteroposterior/AP plane, a decrease of balance in the mediolateral/ML plane, but also lower CoP rates for obese women. Programs aimed at reducing body weight have generated an increase in balance in the ML plan, so the stability in this plan decreases. For the AP plane, the destabilizing influence of the body mass is noticed only when the visual control is missing, the obese women group being more stable in the frontal plane than the normal weight group in the natural bipedal position [47].

The application of oriental Yoga techniques through planned structures (4 weeks × 3 lessons per week × 45 min/session) generates the optimization of the static balance investigated by Functional reach test and One leg standing balance test, for obese young people aged 21–25 years, according to [48]. A similar study highlights the beneficial role of yoga asanas (applied 6 weeks × 3 workouts per week × 30 min/workout), in terms of muscle strength values and static balance level assessed by Stork balance test, for a group of college students aged 18–25 years [49]. Other recent research highlights the effectiveness of Wii Fit Exergames, applied for 6 weeks to groups of obese and normal weight university students, with beneficial effects on motor competence and static balance [50]. The use of unstable multi-dimensional surfaces for the training of young basketball players (boys) for 6 weeks × 2 days/week × 35–50 minutes/training is more effective in increasing the indexes of dynamic balance, compared to the classic/stable surface variant, according to [51]. All this research reinforces the idea that the physical efforts correctly planned and oriented towards the request of the sensory apparatus that conditions the manifestation of balance have beneficial effects on the bodily stability of those involved.

5. Conclusions

The results obtained by the investigated group show lower values of the overweight group in most of the balance assessment tests, but the lack of statistically significant differences (except for the Stork test) indicates that the working hypothesis is not confirmed. We believe that this situation is due to the involvement of all the tested subjects in curricular, leisure or performance activities, which ameliorate the differences from the underweight and normal weight groups, as a specific feature of the studied group.

The limitations of our study result from the low number of tested subjects (especially for the underweight group and overweight) and the non-use of high-performance technique (baropodometry), which would have provided more accurate information about CoP (center of pressure) variations in the antero-posterior and mid-lateral plane, while maintaining static positions and dynamic tests. The presentation of the comparison of the results between genres and classes of physical activity (NA/non athletes, TSG/team sports games and IS/individual sports), as well as the interaction between these independent variables will be made in another scientific paper, due to the high volume of data.

Author Contributions

GM, IO and GDM performed the conceptualization; GDM, IO and GM performed the methodology; IO, GM and GDM performed the validation; GDM, GM and IO performed the formal analysis; GM, IO and GDM performed the investigations; GDM, GM and IO performed the data curation; GDM, IO and GM performed the writing—original draft preparation; GM, IO and GDM performed the writing—review and editing; GDM, IO and GM performed the visualization; GM, IO and GDM performed the supervision; IO, GM and GDM performed the project administration. All authors have read and agreed to the published version of the manuscript.

Ethics Approval and Consent to Participate

All participants were informed of the purpose of the research and the procedures. The study was conducted with the free consent of the students, who participated voluntarily in this research. The standards for investigating human subjects were met, according to the Helsinki Declaration (2013). The approval number is 233/HCEU/14.04.2022.

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Conflict of Interest

The authors declare no conflict of interest.

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